

## **REMARKS**

### **1. Summary of the Last Office Action**

In the Office Action mailed May 31, 2011, the Examiner: (i) rejected Claims 76-79 under 35 U.S.C. § 112(1 and 2), on the basis that it was not understood what is meant by the term “maximally corresponds” in Claim 76; (ii) maintained the prior rejection of Claims 76-79 under 35 U.S.C. § 103(a) as being allegedly unpatentable over U.S. Patent No. 6,533,563 (Otaigbe) in view of U.S. Patent No. 5,171,489 (Hirao); (iii) maintained the prior rejection of Claims 72-75 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Otaigbe in view of Hirao in view of EP Patent No. 1170318 (EP '318); (iv) maintained the prior rejection of Claim 75 under 35 U.S.C. § 103(a) as being allegedly unpatentable over U.S. Patent No. 5,910,558 (Schoenherr) in view of Otaigbe; and (vi) maintained the rejection of Claims 73, 76, 77, and 79 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Schoenherr in view of Hirao.

### **2. Status of the Claims**

Claims 72-79 are pending, of which claims 72 and 76 are independent and the remainder are dependent. Claims 38-71 and 80-94 are withdrawn.

Applicants have amended claims 72, 73 and 76 to better clarify the invention, and respond to the Examiner's § 112 rejection. Claim 77 is amended for readability. No new matter has been added.

### **3. Response to Rejections under 35 U.S.C. §§ 102 and 103, and 112**

As noted above, the Examiner rejected all of the pending claims. Reconsideration of the rejections is requested.

Addressing the § 112 rejection first, Claim 76 has now been amended by deleting the objected term “maximally corresponds to the value of,” which has been replaced by “does not lie above”. This wording is literally disclosed in paragraph 75 of the published specification (in the first paragraph following the header “Spray Drying” of Embodiment 3). It should be clear by this wording that the meaning is “is not greater than”. It is believed that the § 112 rejection is thereby overcome.

The Examiner has also rejected Claim 76 (and its dependencies) as being obvious over Otaigbe in view of Hirao, as well as Schoenherr. Applicants previously amended this Claim to clarify that (i) the powder is one comprising a first component in the form of essentially spherical powder particles and at least one of a stiffening fiber or a reinforcing fiber *is for use in the production of three-dimensional structures or molded bodies by means of layered manufacturing methods*, and (ii) a medium length L50 of the fibers is not greater than (does not lie above) the value of the medium grain size  $d_{50}$  of the spherical powder particles.

The claim feature concerning medium length L50 of the fibers corresponding to the value of the medium grain size  $d_{50}$  is very advantageous for the layered manufacturing methods, wherein layers have to be very evenly spread. Such a feature, however, is not disclosed or suggested by the cited references.

Otaigbe discloses manufacturing a powder having spherical particles in a diameter range from 5 to -200  $\mu\text{m}$ . Hirao discloses manufacturing cut fibers having a length in the range of 30 to 50 **mm** -- **huge**, compared to Applicants’ ranges in point (see, in particular, Claim 72 range). A proposed combination of both of these patents’ disclosures does neither teach nor suggest the fabrication of a powder comprising a first component in the form of essentially spherical powder particles and at least one of a stiffening fiber or a reinforcing fiber, wherein

a medium length L50 of the fibers does not lie above the medium grain size  $d_{50}$  of the spherical powder particles to be achieved. (See also amended Claim 73.) The value range disclosed by Hirao is much larger than the value range disclosed by Otaigbe. Hirao describes the manufacturing of composite staple fibers. This implies the manufacturing of very long composite fibers with a very small fiber diameter. If particles could be possibly obtained by a combination of Otaigbe and Hirao, these would be particles from which the fibers would greatly protrude. Such particles, however, would not be suited for use in the production of three-dimensional structures or molded bodies by means of layered manufacturing methods, because it would not be possible to achieve smooth, uniform powder layers using such particles. Nor does Schoenherr supply, disclose or suggest such a relationship between medium grain size of the spherical powder particles and contained fibers. Schoenherr does not disclose a method for producing a powder that is suitable for the use in the production of three-dimensional structures or molded bodies by means of a layered manufacturing method.

In order to achieve a powder which is suited for use in the production of three-dimensional structures or molded bodies by means of layered manufacturing methods, e.g., laser sintering, present Claims (76 and 73) call out that a medium length L50 of the fibers does not lie above the medium grain size  $d_{50}$  of the spherical powder particles to be achieved. This makes the powder especially suited for laser sintering because it allows the formation of a very uniform surface. This provides for a very, very fine layering to be achieved through the build-up of essentially two-dimensional layers into a three-dimensional construct. However, none of the cited references addresses the problem of forming a uniform powder layer suited for this process, especially in the form of laser sintering. Further, none of the cited references discloses or suggests a relation between the fiber length and the particle size.

That is the problem which is being addressed by the present Claims, and the invention as expressed in these Claims. The prior art cited by the Examiner does not hint at this problem, and therefore there is no reason for a person of skill to even consider the combinations of the prior art put forth by the Examiner. The present invention of these Claims has solved the problem by recognizing a relation between the medium length L50 of the fibers and the medium grain size  $d_{50}$  of the spherical powder particles, whereby it can be ensured that the particles of the powder have the advantageous effect of enabling a uniform powder layer for laser sintering even if stiffening fibers or reinforcing fibers are included in the particles. This is not obvious.

Regarding rejected Claim 72 and its dependencies, the addition of EP '318 to the mix of patents applied by the Examiner does not change the outcome, of non-obviousness. Applicants previously have amended Claim 72 to clarify that (i) the powder comprising essentially spherical particles of an aromatic polyether ketone plastic is *for use in the production of three-dimensional structures or molded bodies by means of layered manufacturing methods*, and (ii) a medium grain size  $d_{50}$  of the spherical powder particles lies in a range from about 20 micrometers ( $\mu\text{m}$ ) to about 150  $\mu\text{m}$ . As discussed, this use limitation is very important to the invention, as the layered manufacturing process employing the inventive method is a very particular environment.

In particular, Schoenherr does not disclose the claim feature of "wherein a medium grain size  $d_{50}$  of the spherical powder particles lies in a range from about 20 micrometers ( $\mu\text{m}$ ) to about 150  $\mu\text{m}$ ." This range of grain sizes is important for the suitability for the layered manufacturing method. Second, Claim 72 does not reasonably or logically follow from the combination of the cited references. In particular, the primary reference Otaigbe

does not disclose or suggest the claim feature of “wherein a medium grain size  $d_{50}$  of the spherical powder particles lies in a range from about 20 micrometers ( $\mu\text{m}$ ) to about 150  $\mu\text{m}$ .” Further, Hirao and EP ’318 fail to make up for the deficiency of Otaigbe. Again, the combination proposed by the Examiner would not yield the claimed “essentially spherical powder particles.”

Moreover, in the prior art, the size ranges are defined in such a general und unspecific manner that they may not be regarded as “disclosed with sufficient specificity” to apply to the presently claimed invention in a meaningful way. This especially applies because the size ranges for the fiber length and for the particle size are disclosed separately in this prior art, without taking a possible relation between the fiber length and the particle size into account.

In light of the above, “wherein a medium grain size  $d_{50}$  of the spherical powder particles lies in a range from about 20 micrometers ( $\mu\text{m}$ ) to about 150  $\mu\text{m}$ ” does not reasonably or logically follow from the limited disclosure of the cited references, and certainly does not apply in the context of the invention, which is layerwise manufacturing (e.g., laser sintering). Since the combination of the cited references would not reasonably or logically result in the invention of Claim 72, Applicants submit that Claim 72 is allowable. Furthermore, Applicants submit that Claims 73-75 are allowable as well for at least the reason that they depend from allowable Claim 72 (and Claim 73 for the reason discussed with respect to Claim 76).

## **Conclusion**

For the foregoing reasons, Applicants submit that Claims 72-79 are allowable. Therefore, Applicants request favorable reconsideration and allowance of the claims.

Applicants do not acquiesce in any assertion by the Examiner that is not expressly addressed by these remarks. Should the Examiner wish to discuss this case with the undersigned, the Examiner is invited to call the undersigned at (312) 913-2137.

Respectfully submitted,

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